Beef Cattle Health Management I and II

Coordinator: Dr. Tom Hairgrove

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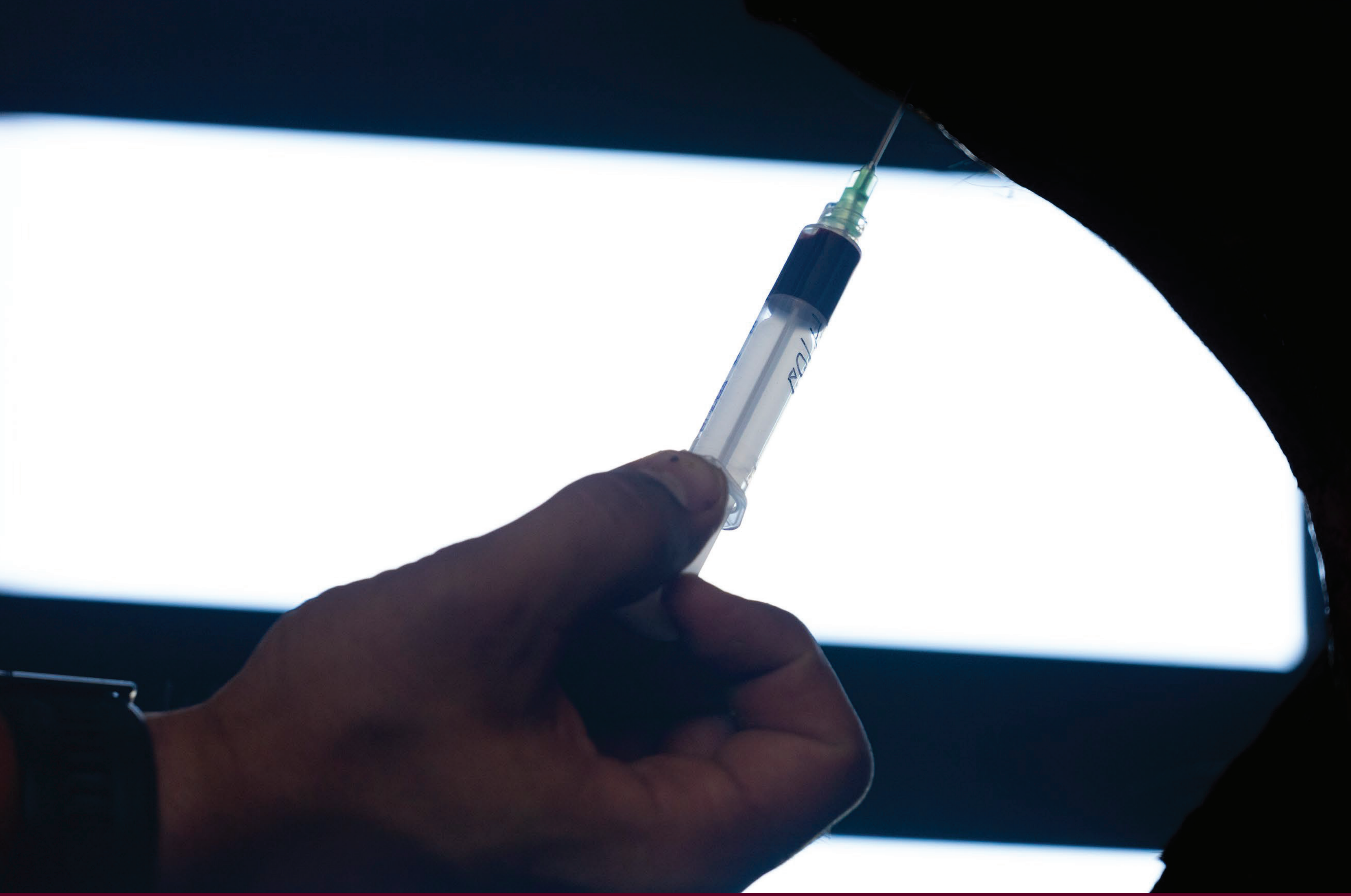

Beef Cattle Health Management I and II

CAPITAL FARM CREDIT

Study to Estimate Prevalence and Geographical Distribution of Bovine Trichomoniasis in Texas using Penile Tissue Collected at Slaughter

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Introduction

Bovine Trichomoniasis (Trich) is a venereal disease of cattle caused by the protozoan *Tritrichomonas foetus*. Transmission of *T. foetus* occurs during natural breeding; the bull and the cow can infect each other; however, infected cows can eventually clear the infection while the bull remains infected for life. Bovine Trichomoniasis is traditionally associated with early pregnancy loss, and there is a perception that purchasing cows that are 120 days pregnant is an acceptable, safe biosecurity practice. Rhyan et al., (1988) reported one-third of abortions occurred in the last trimester, having ramifications for purchasing bred cows as replacements and the immediate comingling of these cows with the herd. A well-thought-out biosecurity plan based on individual producers' risks is essential to managing this disease. The bull is persistently infected where the organism resides on the surface of the penis and prepuce of the bull. The bull does not mount an immune response but serves as a sentinel for *T. foetus* in a regulatory control program.

When the cow becomes infected, *T. foetus* colonizes the vagina, multiplying and traversing the cervix and infecting the uterus, often leading to an abortion during a variable period. Cows naturally clear the infection and mount a short immune response, allowing cows to rebreed and deliver a live calf. After clearing the infection, cows can rebreed and produce viable calves (Rae and Crews, 2006).

Rationale For Research Project

The Texas Animal Health Regulations currently require testing all bulls for *T. foetus* changing possession or bulls adjacent to an infected herd. Producers are not required to test bulls destined for slaughter, and a producer's herd could unknowingly have undetected chronic Trichomoniasis, creating a biosecurity threat to neighbors. Targeted producer education, as well as an understanding of the prevalence and geographical disease distribution, is essential to the success of a state control program. This project involves collecting and testing bull penile tissue for *T. foetus* at slaughter.

Research Design and Methods

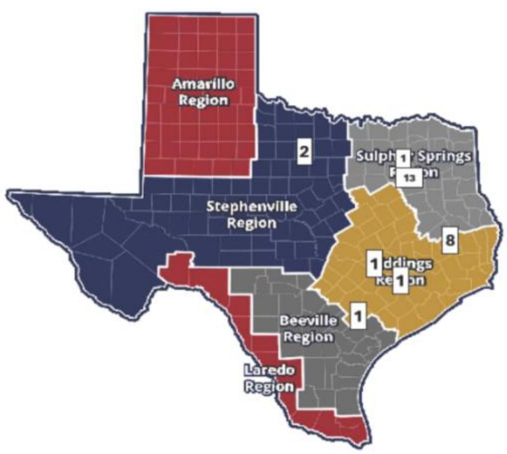
According to USDA estimates, 320,000 breeding beef bulls are in Texas. Estimating a 5% prevalence of *Tritrichomonas foetus*, testing 1,000 bulls provides a 95% confidence interval of 3.7%-6.5% confidence. Penile tissue samples collected from 1,000 bulls over 12 months will be analyzed. RT-PCR testing on tissue extracted in phosphate-buffered saline will be conducted at the Texas A&M Veterinary Medical Diagnostic Laboratory.

For this research, we obtained penile tissue samples from Texas bulls harvested at Lonestar Beef Processors, San Angelo, Texas. We removed approximately 4 inches of the distal penis and individually bagged, identifying only the origin of the bull. In the Laboratory, we extracted approximately 5mm of tissue from the penis and placed them in a 2ml Falcon tube with 1.5 mL of phosphate-buffered saline (PBS) and two metal beads. The samples were sent to the Texas A&M Veterinary Medical Diagnostic Laboratory (TVMDL) for processing and testing with a Quantitative real-time PCR (qPCR).

Results

We have collected 529 samples so far and calculated the prevalence of Trichomoniasis in Texas as 5.33%. The map demonstrates the estimated geographical distribution and prevalence of Bovine Trichomoniasis in Texas.

Geographic Distribution
Prevalence 5.33%



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A Case of Iron Toxicosis in Cattle

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Introduction:

Iron toxicosis is uncommon in cattle because of the regulation of iron at the point of intestinal absorption, even when uptakes are high. The maximum tolerable concentration of dietary iron is 500 ppm for cattle and sheep. Animals can tolerate considerably higher dietary exposure than when consumed in water (Klasing et al. 2005). Iron from the digestive tract enters the duodenal mucosal cells. The iron is either lost as the mucosal cells slough into the gastrointestinal lumen or bound as serum transferrin. The animal cannot actively excrete iron. When iron intake is sufficiently high to defy regulation, especially if there are low levels of calcium or phosphorus and vitamin E in the diet, iron toxicosis can occur. Toxicosis occurs when tissue overloads exceed iron binding capacity; reactive (free) iron causes peroxidative damage to lipid membranes. According to Underwood and Suttle (1999), the antioxidant status of the animal can influence the amount of damage to the animal. Iron may have a direct negative inotropic effect on the myocardium. Sporidesmin, the mycotoxin responsible for facial eczema in sheep, exerts its damage through the intracellular formation of free radicals strongly catalyzed by copper; adding iron to the diet binds copper, helping control facial eczema (Munday and Manns, 1989). According to Mills (1985), the proposed mechanism for inhibiting copper absorption by iron salts involves the formation of a complex between iron, copper, and sulfur within the rumen.

Case Study:

In August of 2023, a beef cattle operation in north Texas began to experience sudden cow deaths. Initial postmortem samples submitted to the Texas Veterinary Medical Diagnostic Laboratory were in an advanced state of autolysis, making diagnostic testing problematic. Liver trace mineral analysis indicated a severe copper deficiency (2.06 ppm- normal range 125-650 ppm) and a low zinc level (79.74 ppm- normal range 120-400 ppm). In January 2024, another cow died, and diagnostic tests again noted a deficient copper (33.16 ppm) and elevated selenium (6.53 ppm- normal 1.5-3.5 ppm). There were lesions in the kidney, liver, lung, and spleen, indicative of an acute hemolytic crisis. There were no indications of infectious diseases; an Extension range specialist and a veterinarian visited the ranch in February, and determined involvement of poisonous plants was unlikely. Cattle were grazing Rye and Bermuda grass, consuming a loose trace mineral, and were in a body condition score of 5 on a (1-9 score).

A brownish tinge was noted on the pasture, and the owner explained it was a by-product of preparing reservoir water for human consumption. Typically, ferric sulfate is added to the water, dissolves, and the iron attaches to the organic matter and silt and clay suspended in the raw water; once attached, they clump together and precipitate, leaving clear water to process for consumption. A by-product of water preparation, the sediment containing the solids and iron was placed on untilled soil in these pastures. The product applied in April of 2023 had an iron content of 160,000 ppm, and the product used in August had an iron content of 397,000 ppm. Samples of water and silt from a subset of ponds in pastures had significant iron levels in the silt and water, probably from rain runoff. These samples were from pastures that housed the cows.

Postmortem laboratory results from cattle and results from sampling of soil, water, and forage are consistent with iron toxicity. Iron binds to copper and hinders absorption, hence the consistent deficiency of copper in the liver. Iron also produces peroxidase damage to lipid membranes, explaining the liver lesions noted by the pathologist.

The treatment involved in this case would focus on supplying copper through rumen wire and enhancing the antioxidants by providing a reliable oral source of vitamin E.

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Farm and Ranch Level Biosecurity for Ticks and Accompanying Diseases

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External parasites have been estimated to annually cost the US beef cattle industry $2.4 billion [8, 10] through the direct effects of parasitism, and an even greater cost when animal handling and tick treatment expenses are included. Direct production costs that accrue from tick parasitism include irritation, blood loss, weight loss, loss of body condition, and reduced reproductive capacity [4, 19, 23]. Additional indirect costs can accrue from the transmission of pathogens that result in tick-borne diseases. More than ten species of ticks with different seasonal activities provide year-round risk of tick infestation in the Southern Region [http://tickapp.tamu.edu; 20].

Most tick species that parasitize grazing cattle have either a three-host or one-host life cycle (Figure 1) in which the pattern of periods of blood-feeding (lasting days to weeks) on a host is followed by very long periods (months to years) off-host in rangeland habitats for molting, egg laying, and waiting for the next host encounter. There are several key features from these life cycles that are important to the prevention and/or management of ticks. The long periods of blood-feeding (days to weeks) provide opportunities for ticks to be transported to new locations. The off-host period of the life cycle can be greater than 95% of the entire tick generation time. Tick survivorship and population dynamics are affected by many factors including habitat types, host availability, and environmental conditions (temperature, RH, precipitation). Hot-dry weather patterns tend to suppress tick survivorship while cooler and/or wet weather patterns tend to increase tick survivorship. Most tick species produce one generation per year. Thus, tick abundance at a given time is the result of cumulative factors occurring through the previous year.

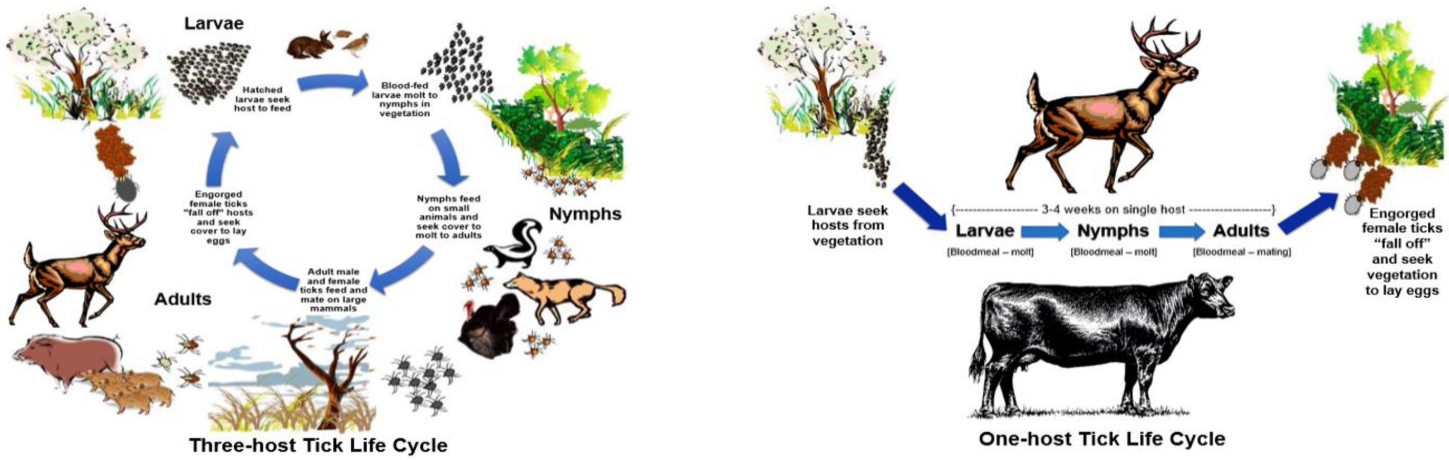

Figure 1. Left: Typical three-host tick life cycle exhibited by the Lone Star tick, Gulf Coast tick, American Dog tick, and Blacklegged tick. Right: Typical one-host tick life cycle exhibited by the Winter tick. From more information, please visit http://tickapp.tamu.edu/

Farm and Ranch Level Biosecurity

Prevention – impedes the introduction of ticks into the operation. This involves the isolation and/or treatment of new animals that were purchased to add to or rebuild a herd, or animals moved to other property locations and returned to main operation, as they can potentially introduce ticks and tick-borne pathogens into the home property and herd. These measures should include treating newly purchased animals for internal and external parasites and even quarantining them before introducing them into the existing herd [18, 21]. New animals should be quarantined for 21-30 days before introduction into the existing animal herds [27]. This can help prevent the introduction of ectoparasites like ticks, endoparasites, or potential illnesses to your existing animal herd, even invasive plants. During the quarantine period, new animals should be checked for ticks and then treated with an acaricide. Isolation and/or treatment also includes native farmed wildlife or exotics being brought onto the property where cattle operations are located. If possible, all wildlife and exotics should be quarantined and examined for ticks and other external and internal parasites before being placed onto the property.

Surveillance – Routine monitoring of livestock on your operation to determine which species are present, the level of infestation, and treatment needed.

Integrated Tick Management – strategies developed [5, 23] that consider holistic approaches [17, 21] to the entire tick system and can be practiced in harmony with best practices for land stewardship, sustainability, and animal health. The holistic approach starts in the environment and is aided with on-animal application control methods [25] and is based upon four parts:

1) **Habitat/brush management** is often performed to increase forage production and control undesired woody species [2, 18]. Mowing grasses in pastures and reducing forbs eliminates suitable sites for ticks to search for hosts. Clearing the undergrowth of woody patches will allow increased air flow under larger woody species, decreasing humidity, which can help dry ticks out and kill them. This practice can also reduce tick populations by limiting vegetation habitats that support tick development and survivorship. Because ticks are susceptible to drying out, they are typically not found in sunny areas with lower cut grass; they are more often encountered in areas with higher canopy cover and decreased sunlight penetration through the canopy.

   Three main types of brush management:
   1) Herbicides: herbicide applications targeting woody plants can decrease the abundance and distribution of undesirable brush species thus, opening canopy and inherently reducing the off-host survival of some tick life stages [20, 22].
   2) Mechanical removal: mechanical removal of brush reduces vegetation density, helping reduce tick habitat and populations. Also, trimming tree branches and shrubs allows more sunlight into the environment which can reduce suitable tick habitats and tick survival.
   3) Prescribed fire: also known as prescribed burning, is a recognized method of controlling some tick species and internal parasites [7, 11, 16, 20, 24]. When a prescribed burn is implemented, ticks can be killed directly through incineration [16]. Prescribed burns that are slow moving can generate temperatures necessary to physically damage or kill ticks on improved pastures and rangelands [20]. Prescribed fire is also known to influence how cattle use a landscape [1]. Additional benefits of prescribed fire as a management tool include the removal of undergrowth, leaf-litter, and shrub vegetation which renders the soil-vegetation interface less hospitable for tick survival while off the host [20, 24].

2) **Forage/pasture management** should include grazing or pasture rotations, fencing, and strategic placement of supplemental feed and water [18, 23]. Grazing or pasture rotations change availability of animal hosts to ticks actively searching for a host. Fencing can be used to prevent or limit access by stray animals and certain wildlife species onto properties that can serve as tick hosts [9]. Moving fence lines 10 feet from the edge of the woods and keeping vegetation in those corridor areas mowed short and free of debris can prevent tick movement toward pastured animals. Eliminating brush and woody debris like fallen branches from the perimeter of pastures can reduce small mammal habitat, which in turn reduces immature tick hosts. Pasture modifications can be made to reduce contact animals have with wooded perimeters where ticks are often found. It is not necessary to chemically treat pastures for ticks [25]. However, if pastures include wooded edges, these areas can be treated with acaricides to reduce tick presence [25]. Locations of water and supplemental feed can modify the spatial

aspects of cattle use and selection (cattle distribution, forage utilization, and travel patterns) [3, 6, 12, 13, 14]. These spatial modifications can influence the exposure of cattle to ticks and how infested cattle redistribute ticks in a landscape. Additionally, weather can influence the use and selection of patches within a landscape. Cattle are more likely to seek out shade (resting site) during the heat of the day, while in the early mornings or late evening they will be found grazing (feeding site). Temporal changes in pasture site use and selection can be as short as within an hour, to a whole day, or longer in duration when periods of drought exist and can vary greatly from season to season. Each landscape is different and thus cattle usage and selection in space and time will vary from property to property. Knowing how cattle use and make selections within a landscape both spatially and temporally can help in the development of targeted grazing and pasture management practices.

3) **Wildlife management** in cattle grazing systems includes managing wildlife diversity and populations at levels that minimize contributions to tick populations. Avoid overabundance of native and/or exotic hoofstock in cattle grazing systems. Recognize that native and exotic hoofstock serve as hosts to both immature and adult ticks, all contributing to sustainability and/or increase in tick populations. There are no practical acaricide applications for wildlife. Be sure to check animals for ticks right after harvest to avoid transporting ticks with the harvested animals to another location. Ticks will detach and leave a dead host as the body cools. Wildlife moving across distances can transport ticks from surrounding properties and landscapes into your operation. Each wildlife species has a different home range across the landscape (Figure 2).

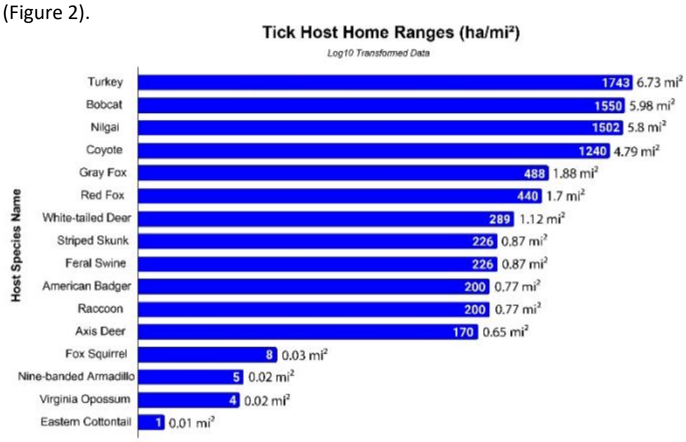

Figure 2. Tick host home ranges for 16 important wildlife species found across Texas landscapes in hectares and miles (References 28-33).

4) **On-animal acaricide options** for treatment of infested livestock focuses on tick suppression during that brief period of the tick life cycle when seasonally active ticks are obtaining a blood meal. Remember: *Treating livestock with acaricides only attacks a small window of the tick's life cycle (<2%)!!* Acaricide applications should not be used as a cure-all solution for tick control and management. It is important to always read and follow the manufacturer's label recommendations concerning safety restrictions, dosage, and application when working with acaricides. Frequent and continuous application of chemicals on animal hosts is not sustainable on disease, environmental, or economic grounds [15]. Acaricides for beef cattle application can be found in Table 1.

Important decisions to be considered to achieve maximum value in tick suppression using acaricides:

1) Choice of acaricide chemical class (active ingredient):
   - Organophosphates (e.g., chlorphenvinphos, coumaphos, diazinon, dioxathion)
   - Carbamates (e.g., carbaryl)
   - Pyrethrins/synthetic Pyrethroids (e.g., permethrin, decamethrin, deltamethrin, cyhalothrin, cyfluthrin, and flumethrin)
2) Formulation and Method of Delivery:
   - Sprays and Dips
   - Ear Tags
   - Dusts and Dust Bags
   - Backrubbers and Facerubbers
   - Pour-on and Spot-on
   - Aerosol Spray
   - Environment
3) Timing of Application:
   - The timing of application relies on what tick species needs to be controlled and when that tick species is seasonally active (obtaining a bloodmeal from the host = approximately 2% of a tick's life cycle).
4) Preferred feeding sites of ticks on animal hosts (important to concentrate control and for inspection):
   - Head: nostrils/muzzle, eyes, ears (in and around the ears), poll.
   - Body: throat, dewlap, breast/brisket, belly, scrotum flank, tail head and down to udder region.
   - Legs: forearms/armpits, between toes or hooves.

Table 1. Labeled acaricides for tick control in beef cattle operations. ***Mention of a product is not an endorsement by the authors or by Texas A&M AgriLife***

Application Type	Instructions	Acaricide
Sprays and Dips	Sprays: Treat with hand pump sprayer or large mounted sprayer. Use enough water to cover the animal thoroughly to run-off. Does not provide long-term control. Have no residual effect and need to be applied weekly to be effective. Dips: Effective and ensure good coverage by wetting the animal thoroughly.	Co-Ral 6.15% Permectrin II GardStar 40% EC Atroban 11% EC Permethrin EC Spray Starbar E-Pro (36.8%) Permectrin CDS 7.4% Prolate/Lintox HD Ravap E.C. Spray Permectrin S 1.0%
Ear-Tags	Plastic device in animal's ear. Dispenses acaricide over time.	XP820 Insecticide Cattle Ear Tag Corathon Insecticide Cattle Ear Tag CyLence Ultra Insecticide Cattle Ear Tags OPtimizer Insecticide Ear Tag Patriot Insecticide Ear Tag Warrior Insecticide Ear Tag

Ear-Tags	Plastic device in animal's ear. Dispenses acaricide over time.	Saber Insecticide Ear Tag
		Permethrin Insecticide Ear Tag
		Gard Star Plus
		Dominator Insecticide Ear Tag
		PYthon Magnum Insecticide Ear Tag
		Tri-Zap Insecticide Cattle Ear Tag
Dusts and Dust Bags	Hand shakers or self-treatment dust bags. Non-invasive. Placement for self-use essential.	Permethrin 0.25% Dust
		Co-Ral Livestock Dust, ProZap Zipcide Dust 1%
		PYthon Dust 0.075%
Backrubbers and Facerubbers	Self-treatment. Non-invasive. Placement for self-use essential.	Permectrin II
		Co-Ral Fly and Tick Spray
Pour-on and Spot-on	Applied down animal's backline. Chemical absorbed through skin and circulated through animal's system.	Atroban DeLice 1% Pour-on
		Brute Pour-on 10%
		Ultra-Boss Pour-on 5%
		Permectrin S
		Permectrin CDS
		Clean-Up II
Aerosol Spray	Spray onto ticks in/outside of ear.	Prozap Screw Worm Ear Tick Aerosol
Environment	Follow label instructions for pasture and rangeland applications, including precautions for pollinators such as bees.	Seven SL
Information in this table was collected from: https://tickapp.tamu.edu ; https://livestockvetento.tamu.edu/tick-insecticides/ ; https://livestockvetento.tamu.edu/files/2010/10/Managing-External-Parasites-of-Texas-Cattle.pdf ; https://www.veterinaryentomology.org/vetpestx ; https://extension.uga.edu/content/dam/extension/programs-and-services/integrated-pest-management/documents/handbooks/2022-comm-chapters/Animals.pdf		

- FOLLOW THE LABEL DIRECTIONS! Acaricides must be used in the manner prescribed or consistent with the label instructions.
- Store pesticides safely. Keep acaricides locked up and beyond the reach of children and animals. Keep acaricides in their original packaging with the label securely affixed. Storage areas should be clearly marked and locked. Do not store pesticides with food, feed, veterinary supplies, or personal protection equipment. Do not store pesticides in areas exposed to excessive heat (summer) or cold (winter). Unused acaricides should be stored in their original container or package.
- Always wear the proper personal protection equipment (PPE) described on the acaricides label. This is a legal requirement and greatly reduces your personal risk of exposure from mixing or applying pesticides.
- Measure pesticides carefully. Mix no more pesticide than you need.
- Dispose of acaricide waste properly. Refer to the acaricide label for proper disposal protocols.

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TEXAS A&M AGRILIFE EXTENSION

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BIOSECURITY FOR BEEF CATTLE OPERATIONS

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For beef cattle, biosecurity involves a system of management practices that prevent diseases from infecting a herd. Although biosecurity is often associated with foreign animal diseases, the term also applies to common diseases that affect herds, such as blackleg and bovine viral diarrhea. Vaccines can help prevent disease, but other management practices can be even more important. By developing biosecurity protocols that protect cattle from the common diseases, producers are establishing a safety net against a possible outbreak of a foreign animal disease in the U.S.

HOW DISEASE IS SPREAD

Disease spreads directly—from an infected animal to a susceptible animal—or indirectly, from an infected animal to an object or equipment, and then to a susceptible animal. For example, feeding a calf with a bottle that has not been properly sterilized can be a way of indirect transmission.

Disease is transmitted in seven primary ways:

- Aerosol: Disease pathogens are carried in the air on moisture droplets from sneezing or coughing.
- Direct contact: Disease pathogen contacts an open wound, saliva, blood or mucous membranes, or is passed from nose to nose, by rubbing and biting.
- Oral: Susceptible animals consume disease-causing athogens in contaminated feed and water or lick or chew contaminated objects.
- Reproductive: Disease pathogens are spread during mating or gestation.
- Vehicles: Contaminated objects, such as needles, trailers, trucks or clothing, transfer the disease-causing pathogen from an infected animal to a susceptible animal.

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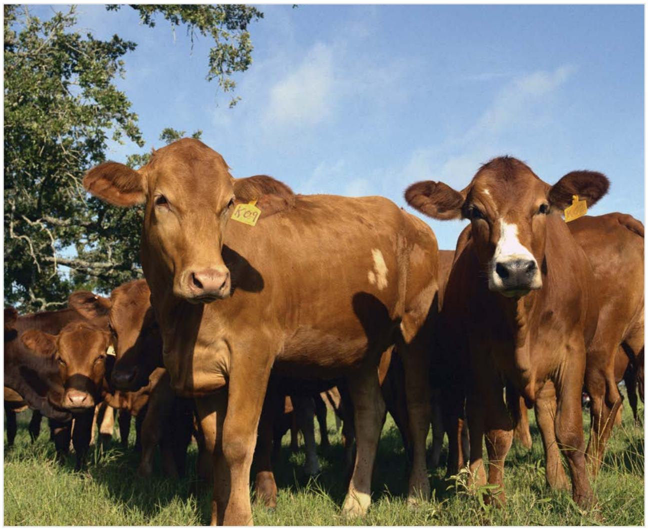
- Vector-borne: A living insect, animal or human carries the disease from an infected animal to a susceptible animal.
- Fomites: Diseases are transmitted through contaminated soil, water and food.

IMMUNITY

Immunity allows the animal to resist a disease by preventing the pathogen's development or by counteracting the effects of its toxins. Immune animals have antibodies, which destroy a specific pathogen before it causes an illness. Immunity is natural, active or passive.

Natural immunity is provided by the body's natural defenses, such as the skin and nasal passages, which help keep disease pathogens out of the body. Some cells in the body also attack disease-causing foreign particles. Fetuses can acquire antibodies in utero through placental transfer.

Passive immunity comes through the transfer of antibodies from one animal to another, such as through



colostrum in the mother's milk shortly after birth. Newborns must receive about 10 percent of their body weight in colostrum within the first 24 hours after birth to ensure some protection against diseases.

Active immunity is provided by protective vaccinations or by the body's fight against an infection. Both modified-live and killed vaccines cause the body to produce antibodies without actually acquiring the disease. Booster vaccinations may be necessary to maintain immunity.

VACCINATIONS

Total disease prevention is not possible; therefore, any ranch biosecurity plan requires a sound vaccination program that targets diseases the cattle may be exposed to.

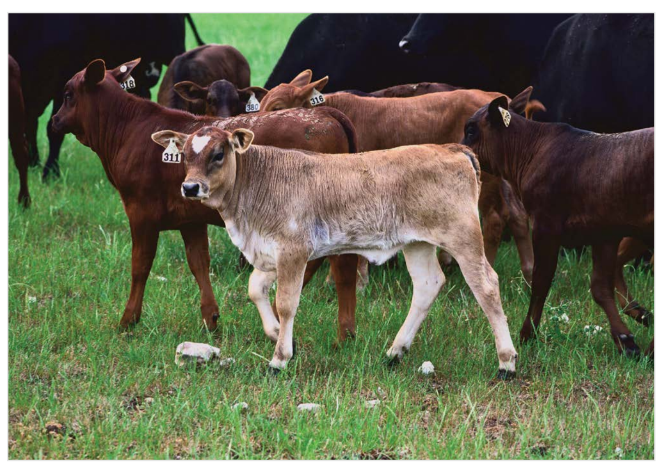
Vaccines are only as effective as the animal's immune response; injecting cattle with vaccine does not guarantee the herd's immunity. Factors such as nutritional, shipping, social and weather stress can decrease the level of immune response. Minimizing animal stress will improve the disease protection within the herd. Handling and administering vaccines according to the manufacturer's label is important in maintaining the integrity of vaccine and providing protection against the targeted disease.

When handling and working with vaccines:

- Read the label and/or medication insert before vaccinating animals.
- Observe the expiration date and storage information.
- Keep refrigerators at the proper temperature to maintain vaccine effectiveness, usually between 36 degrees F and 46 degrees F.
- Protect vaccines from sunlight.
- Give the right vaccine to the right species. If the label indicates it is for use in swine, do not use it in cattle. This extra-label use is illegal unless done under the supervision and recommendation of a veterinarian.
- Give the proper dose in the appropriate area on the animal, using the recommended technique.
- Do not insert a used needle back into an open bottle. Always use a sterile needle.
- Use a transfer needle or a sterile needle to reconstitute modified-live vaccines.
- Use boiling water, not chemical sterilants, to disinfect syringes.
- Mix only the quantity of modified-live vaccine that will be used within 1 hour.
- Dispose of the remaining opened vaccine properly after completing the day's inoculations because the vaccine does not keep well once the bottle seal has been punctured.
- Give booster vaccinations when the label requires it.
- Keep a record of all vaccinations and treatments.
- Follow withdrawal periods.

Consult a veterinarian to ensure proper timing and implementation of a vaccination schedule. Even under ideal conditions, vaccinations are not 100 percent effective. Take extra care in handling and administering vaccines to achieve the highest possible level of immunity.

Evaluate the cost-benefit ratio of any biosecurity management practices. Do the benefits outweigh the costs? For example, if a weaned calf is worth about $550, the loss of that calf can cost the ranch $550 in lost revenue. If a vaccination routine that costs $1.50 per animal, including new needles for each, is implemented on a 40-cow herd, the total cost for this biosecurity practice may be as low as $60. If the result is one more calf, the net benefit is $490.



PROCEDURES FOR HANDLING INCOMING CATTLE

Almost every ranch eventually must add new breeding animals to the operation. Some stocker or feedlot operations continuously add new cattle. These new cattle can bring disease to the ranch. Minimize this risk by:

- Defining the level of disease risk for the new cattle. For example, yearling virgin bulls from a purebred breeder with a strict health protocol may be low risk, while cows from an unknown source may be high risk.
- Isolating new animals from the rest of the herd for at least 3 weeks, and possibly at a location off the ranch.
- Watching the isolated animals closely for symptoms of illness, such as elevated temperature and abnormal behavior.
- Consulting a local veterinarian to determine which diseases to test quarantined animals for.
- Vaccinating cattle according to ranch protocols.

LIMITING UNAUTHORIZED ACCESS TO PASTURES AND CATTLE

Unauthorized visitors may introduce diseases to the ranch, increase the risk of theft and cause liability issues. To help prevent this:

- Keep doors and gates locked at all times.
- Post “No Trespassing” signs.
- Conduct random security checks and look for signs of unauthorized activity or entry.
- Maintain good perimeter fences.
- Know your neighbors and set up a crime watch program.
- Secure pesticides, fertilizers, feed and nutrients.
- Secure water sources and identify alternative sources.

GENERAL BIOSECURITY PRACTICES

Consider these additional general management tips:

- Disinfect reusable equipment, including tattooers, implant guns, ear notchers, dehorners and castration knives, between animals. Sterilize equipment that has been used off the ranch before it is brought back to the ranch.
- Identify cattle and maintain current records.
- Watch cattle for adverse health symptoms or behavior; sudden and unexplained deaths; large numbers of sick animals; unusual ticks or maggots; blisters around an animal’s nose, teats, mouth or hooves; difficulty rising and walking; a drop in milk production; and a large number of dead insects, rodents or wildlife. Contact a veterinarian immediately if these symptoms occur.
- Keep cattle away from exotic wildlife that may harbor disease.
- Develop a carcass disposal plan.
- Remove animals that are “reservoirs” for certain diseases such as Johne’s, trichomoniasis or bovine viral diarrhea. These animals continue to shed the pathogen and infect other animals.
- Avoid fecal and urine contamination of feed and water sources.
- Control pest populations and limit access to feedstuffs.
- Create an emergency contact list of resource people within the community. Post copies near telephones and on bulletin boards. Have employees enter these numbers into their cell phones.

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BOVINE TRICHOMONIASIS

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Bovine trichomoniasis (Trich) is a **venereal disease** of cattle caused by the protozoan *Tritrichomonas foetus*. This disease causes early pregnancy loss and occasional late-term abortions; it may also extend the breeding/calving season.

Although losses are observed in the cow, *T. foetus* lives on the surface of the penis and prepuce of the bull and in the reproductive tract of the cow. Trich prefers a reduced oxygen environment, and it multiplies in the small folds of tissue (crypts) on the bull's penis. Because older bulls have more numerous and deeper crypts and are more easily infected, using young bulls is part of a disease management strategy. There are no obvious signs of Trich in the male, and pregnancy loss is the only sign of the disease in the female.

Transmission of the disease occurs during natural breeding. A bull can infect a cow and a cow can infect a bull. However, most infected cows eventually clear the infection. Once a bull is infected, it remains so for life. Therefore, most control programs focus primarily on the detection and elimination of infected bulls.

During breeding, organisms from the surface of the penis are left in the vagina where they multiply and invade the uterus to create an infection. Cows can still conceive during the few weeks it takes for the uterine infection to develop. Once the organism causes sufficient damage to the lining of the reproductive tract, the cow miscarries or aborts. Cows will naturally clear the infection within a few weeks to a few months and experience a brief period of immunity to the disease. After clearing the infection, cows can rebreed and carry a fetus to term. The period of immunity, though, is short and will not protect subsequent pregnancies if the cow is re-exposed to an infected bull.

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Cows exposed to Trich cannot be considered safe in calf until they are at least 120 days pregnant; open cows cannot be considered free of infection until they have had at least 90 days of sexual rest and are examined and cleared by a veterinarian. Only then should they be placed back into the breeding herd. All newly acquired cows that are less than 120 days pregnant should be isolated from the breeding herd. They may be placed in the breeding herd once they are four months pregnant.

Because approximately 2 percent of infected cows will have a swollen uterus that contains pus (pyometra) and remain infective, all open cows should be examined by a veterinarian. Cows with pyometra should be sent to slaughter. There is no treatment for infected bulls; send them to slaughter.

Trich should be suspected in herds with poor conception rates and extended calving seasons. Infected herds can produce conception rates that range from slightly subnormal to 50 percent or lower, depending on the length of time the disease is in the herd and the number of animals that are infected. Conception rates in herds with controlled breeding seasons of 90 days or less will be even poorer. Shorter breeding seasons expose the problem more dramatically and can actually reduce the long-term production and economic losses caused by herd infection.

Because Trich develops gradually and is not readily apparent, it is better to prevent exposing the herd to the disease rather than trying to control or eradicate it. Trich enters a herd or ranch only via infected bulls, cows or heifers. Again, transmission is from infected bulls to cows or from infected cows to bulls. To eliminate Trich from a herd, allow infected cows to clear the infection and eliminate infected bulls altogether.

A vaccine is available for healthy cattle to aid in the prevention of disease caused by T. foetus. Use of this vaccine in herds with high risk of exposure has been shown to help reduce the economic impact of Trich when administered properly and in exact accordance to the label. It has also been shown to help infected cows recover more rapidly. This vaccine does not prevent all abortions; however, using it in addition to other best management practices will minimize reproductive losses.

Economic losses caused by bovine trichomoniasis can be avoided or minimized by practicing sound biosecurity principles:

1. Maintain good perimeter fences to segregate cattle of unknown status. Fences are the first line of defense in preventing the introduction of Trich in the herd.
2. Keep the bull battery as young as possible. Buy only virgin bulls and heifers, preferably from the original breeder. Unless the virginity of bulls can be positively confirmed, test all bulls before adding them to the herd. All bulls of unknown status should have three negative tests using PCR or culture. These tests should be administered at least one week apart, and bulls should have no contact with cows within one week of the initial test.
3. Implement a defined breeding season. Trich can go undetected in continuous-breeding herds.
4. Identify herd sires and record the breeding group of each bull. If the herd becomes infected, this will make it easier to isolate the problem and start management protocols to eliminate the disease.
5. Consider keeping bulls in the same breeding groups for several breeding seasons. Should there be a false negative bull in the battery, this will keep uninfected cattle from being exposed.
6. Consider small sire groups (but not necessarily single-sire), versus large sire herds, to avoid infecting many bulls in a single season. Monitor pregnancy closely in one-herd grazing systems and implement an annual bull testing program to detect introduction of Trich during the first breeding season.
7. Consider artificial insemination to avoid introducing Trich or to help break the cycle of infection in a herd. Reputable semen companies repeatedly test bulls for many diseases including Trich, to ensure the semen is not contaminated.
8. Avoid buying open or short-bred (less than 120 days) cows. Open or short-bred cows from unknown sources are particularly risky and must be quarantined and examined before they are added to the herd.
9. If you buy replacement cows, isolate them from the existing herd during the first breeding season.
10. If biosecurity measures cannot be adequately implemented or other risk factors exist for the introduction of Trich into the herd vaccinating the cow herd can be utilized to help mitigate economic losses.

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